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(54) Title: USE OF VAPOR-DEPOSITED CONFORMAL COATINGS IN MICROFLUIDIC STRUCTURES

(57) Abstract: This invention relates to methods and apparatus for performing microanalytic and microsynthetic analyses and procedures. The invention particularly provides microsystem platforms comprising microfluidics components wherein the interior surfaces of the components comprise a conformal coating of parylene.

# USE OF VAPOR-DEPOSITED CONFORMAL COATINGS IN MICROFLUIDIC STRUCTURES

This application claims priority to U.S. Provisional Applications Serial No. 60/204,299, filed May 15, 2000, the disclosure of which is explicitly incorporated by reference herein.

## 1. Field of the Invention

This invention relates to chemical and biological assay technology carried out in disposable plastic assemblies, and in particular the devices referred to as microfluidic systems as disclosed in U.S. Patent No. 6,063,589, issued May 16, 2000, and co-owned and co-pending patent applications U.S. Serial Nos. 08/761,063, filed December 5, 1996; 08/768,990, filed December 18, 1996; 08/910,726, filed August 12, 1997; 08/995,056, filed December 19, 1997; and 09/315,114, filed May 19, 1999, the disclosures of each of which are explicitly incorporated by reference herein.

## 2. Background of the Related Art

One of the key requirements of a general purpose microfluidic device is that it is stable with respect to a variety of fluid types. In applications that involve organic solvents or acid or basic aqueous solutions, it is important that the fluid does not dissolve nor swell the interior surfaces of the device thereby altering the nature of the assay fluid and the performance of the device. Dissolution or swelling are real possibilities if the device is made from plastic, as is the present trend.

A less obvious, but equally important loss of stability occurs when molecules from the assay fluid bind to the device itself. For example, in microfluidic serum binding assays of pharmaceutical compounds, the assay yields a true binding curve only when neither a significant amount of serum nor pharmaceutical compound binds, nonspecifically, to the interior surface of the device.

A number of coating processes have been developed that may either protect or passivate a surface but these processes rarely produce conformal coatings. A protecting layer of silicon, for example, may be thermally evaporated and deposited onto an open, plastic microfluidic device but since this type of deposition is line-of-sight it can be difficult to provide uniform coating of deep and tall features. Liquid